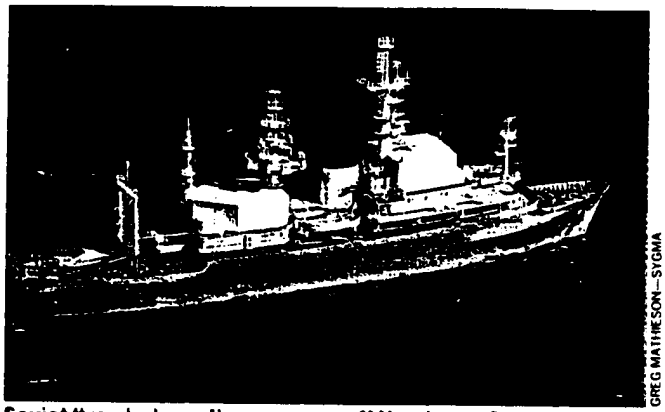
ARTICLE APPEARED
ON PAGE 36

10 June 1985

The War Beneath the Seas

America's security depends on the secrecy of the nuclear subs.

Of all the secrets the Walker family may have slipped to the Soviets, the most damaging could be in the field of antisubmarine warfare. Because of their ability to hide and stay submerged for months at a time, submarines are considered the one invulnerable leg of the strategic triad—probably the only weapons to remain functioning in a nuclear war. As a result, both superpowers have placed a premium on tracking the other side's subs—and keeping their own hidden. The global cat-and-mouse game is played out in open oceans, along shallow coastlines, under the polar icecap and, increasingly, in computer centers and research labs. The stakes are enormously high: as many of this nation's nuclear warheads are deployed aboard submarines as in all U.S. land silos and strategic bombers combined.



GREG MATHIESON—SYGMA

Soviet 'trawler' sporting spy gear off Honduras: Cat and mouse

The United States has long held the upper hand underwater. The Soviet Navy has far more submarines—roughly 280 attack subs to America's 96, and 62 ballistic-missile subs to America's 34. Russian subs are also generally faster, larger and able to dive deeper than their American counterparts. But the U.S. fleet is much quieter and its detection systems are far more advanced—factors that count more than size and speed in the murky world of antisubmarine warfare (ASW). The U.S. edge may be eroding, however, as new generations of Soviet subs become less noisy. And as detection technology advances, running silent may not continue to mean running secret.

For now, the U.S. Navy still tracks Soviet subs almost exclusively through acoustical methods—via a vast network of sophisticated listening devices. One key element is SOSUS (sound surveillance system), chains of hydrophones strung along the continental shelf and at key choke points such as the GIUK Gap between Greenland and Great Britain that Soviet subs must cross to reach open oceans. The underwater microphones collect ocean sounds hundreds of miles away and transmit them via cable to onshore computer centers, where sophisticated supercomputers sift through the whale barks and other noises for the telltale "signatures" of Russian subs.

U.S. aircraft assist in the search by dropping sonobuoys into the ocean. Surface ships also trail long arrays of hydrophones, listening for submarine sounds. In November 1983 a Soviet Victor III-class sub became tangled in the towed-array sonar of the frigate USS McCloy 475 miles off South Carolina and was embarrassingly forced to surface. Surface ships can also send out "active sonar," bouncing sound waves out into the ocean and listening for their echoes. Some of the best underwater ears, meanwhile, are other subs themselves, which constantly listen for enemy counterparts and communicate with other tracking sources. All told, the U.S. sonar and computer technology is so good that Navy personnel often know precisely what Soviet vessel they are listening to, down to its name and hull number. Says one U.S. undersea expert, "American sub skippers think they can find a fish farting at a range of a thousand miles."

But finding Soviet submarines is becoming more difficult. U.S. naval intelligence experts say the Russians have made a quantum leap in silencing their noisy subs in recent years through such techniques as precision tooling their nuclear engines, coating hulls with sonar-absorbing materials and making other external modifications to muffle the sound of water passing around subs as they move. A U.S. fleet exercise in the Pacific earlier this year provided graphic evidence: a U.S. attack sub, modulating its noise and tactics to imitate a Soviet Victor III, was the only vessel to penetrate a U.S. carrier battle group and theoretically "destroy" the carrier.

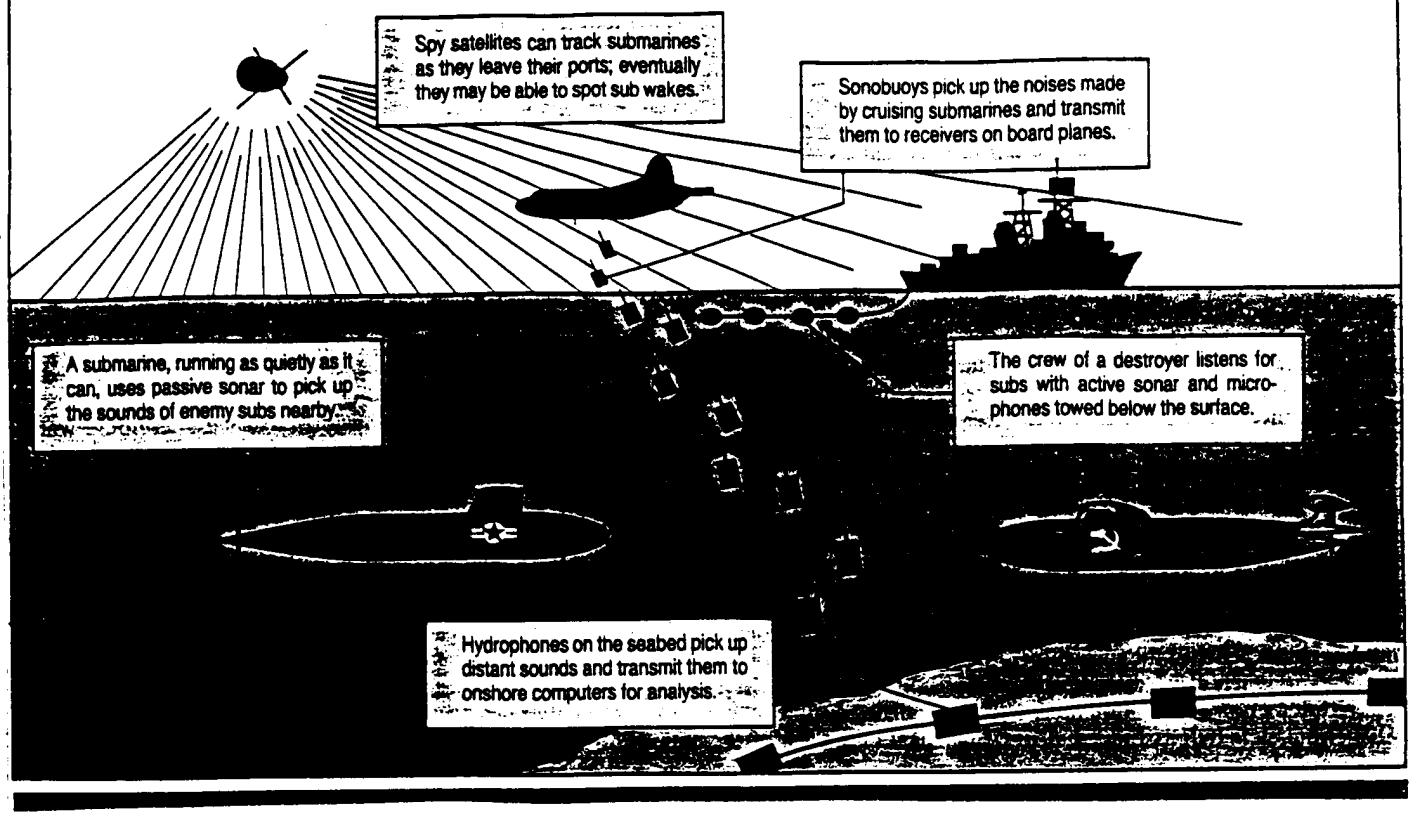
The Soviets have also improved the range of their sub-launched ballistic missiles, allowing their missile-carrying subs to remain in home waters and never cross a SOSUS tripwire while staying in range of U.S. targets. In areas like the Barents Sea and the Sea of Okhotsk, the Soviet "boomers"—as missile subs are called—are not only less vulnerable to detection, they would also be protected by Soviet sea and air defenses in wartime. The point was driven home laughably a year ago when Moscow announced that it was sending its new Delta-class subs into the Atlantic Ocean—just 10 minutes from U.S. cities—in "retaliation" for the deployment of Pershing II missiles in Western Europe. U.S. officials scoffed that the Soviet move had insignificantly decreased U.S. warning time in the event of an attack while substantially *increasing* the Soviet subs' vulnerability. "We would invite them to deploy all their Deltas" in the Atlantic, said Navy Secretary John Lehman.

Ice: Even more ominous for the U.S. Navy, the Soviets have deployed their new Typhoon-class missile subs beneath the Arctic ice pack. There they are well hidden from the ASW eyes of U.S. surface ships and aircraft—and even sonar beams have trouble distinguishing enemy metal from shifting ice stalactites. The mammoth Typhoon boomers—larger than World War II aircraft carriers—are also extremely quiet and

Continued

HIDE-AND-SEEK AT SEA: RUN SILENT, RUN DEEP

From the reaches of space to the depths of the ocean, an array of increasingly sophisticated technology works to spot the movements of submarines. To evade detection the subs try to move through the sea as silently as possible, sometimes hovering near ocean outcroppings or surface ships to hide their presence from the ever-present watchers.



have reinforced conning towers that would allow them to crack up through the ice during wartime and launch their 20 multiple-warhead ballistic missiles at U.S. targets. Some NATO strategists say that polar-deployed Typhoons have altered the whole notion of NATO maritime defenses and present the greatest challenge yet for U.S. attack submarines.

Indeed, detecting enemy subs is only half the ASW battle. U.S. attack subs, surface ships and aircraft must also be able to destroy enemy submarines, and here, too, Russian advances present new challenges. The Soviets' new titanium-hulled Alfa-class subs can travel as fast as 45 knots underwater and dive as deep as 2,000 feet—enabling them to outrun most U.S. antisubmarine torpedoes. In response, the Navy has modified its best sub-launched torpedo, the Mark 48, and there is another saving grace: noise increases in geometric proportion to speed. "The first time they put the pedal to the metal on an Alfa in the Barents Sea," says one U.S. ASW expert, "the noise traveled all the way to Bermuda," where an American SOSUS station picked it up.

NASA: The United States is experimenting with nonacoustical means of submarine detection, many of which involve satellites, but none of them have yet borne fruit. In one technique, known as synthetic aperture radar, satellites bounce intermittent radar pulses to the ocean and synthesize the waves as they bounce back, producing computer-generated images showing details as fine as ocean waves only one foot high. In theory, this should enable a satellite to spot the surface ripples in a submerged sub's wake. But in one recent test, when the Navy gave NASA the general locations of two U.S. subs, NASA was unable to find them—even under ideal conditions with the subs traveling slowly just beneath the surface.

The Pentagon is also experimenting with infrared detection to monitor the wake of warm water left by passing subs. But the subtle temperature differences are dispersed by warm surface waters when the subs are running at depth; infrared is also absorbed by air and clouds. Another possibility is "bioluminescence"—examining the trail of phosphorescent light created when a submarine strikes millions of tiny organisms in its path. But the light changes are faint even at the surface, and they could be impossible to detect at depth—though other submarines could possibly spot them.

Lasers: Still another futuristic technology involves monitoring radiation phenomena such as neutrinos that are produced in large quantities by nuclear engines and cannot be captured by any known shielding material. The Navy has also considered using blue-green lasers, tuned to a frequency that passes through ocean water like light through glass, as a kind of undersea radar to illuminate enemy subs. Using the laser light, however, gives away the tracking sub's position.

The Soviets have been experimenting with synthetic aperture radar for at least a decade. But exactly what the Navy knows about Soviet detection capabilities is among the most classified of military intelligence. (In fact, outside experts say the Navy may well have made secret strides in nonacoustical detection—and reported some successes as failures to keep the Soviets off guard.)

Curiously, one of the most revealing studies of the ASW game to date is the best-selling novel "The Hunt for Red October," published earlier this year by the U.S. Naval Institute Press. The plot centers on the defection of a Soviet missile-sub skipper and the race by both superpowers to find his vessel, the Red October. The search is made all the more difficult because the sub's propellers are tucked inside two tunnels running from bow to stern that shield them from transmitting noise to the water. Author Tom Clancy, who never served a day on a submarine, says he invented the tunnel-propulsion system—complete with a hypothetical Navy test of the concept at the David

Continued

3.

An AWACS Hawkeye—used for maritime spying missions—lands on the deck of the USS Kennedy: Is the U.S. detection advantage eroding?

Taylor Model Basin outside Washington. To Clancy's astonishment, after the book's publication, he received a letter from the head of the test facility saying that such a concept had indeed been tested there. In fact, the Navy plans to use a tunnel-propulsion system—with some key technical differences from Clancy's model—in its new attack sub, the SSN-21, as do the British in their new attack sub, the Trafalgar.

As the U.S. subs grow ever quieter, they, too, are becoming more powerful. The 4,000-mile range of the Trident missile, for example, is nearly twice that of the Poseidon and will increase the Trident submarine's patrol area by a factor of 10, allowing it to cover its targets in the Soviet Union from as far away as the Indian Ocean. The new D-5 missile will increase the range of the Trident ever farther, opening up still wider areas of ocean in which to hide. More important, D-5 missiles represent a great leap in accuracy: experts say they should be able to strike within 500 feet of Soviet targets—compared with the 1,800-foot range of their predecessors.

Details: How much damage did the Walker family do to U.S. hopes for maintaining its ASW edge? Experts may never know for certain. Last week retired Adm. Bobby Ray Inman, former head of the National Security Agency, suggested that information the Walkers supplied may have prompted the Soviets' decision to build quieter subs and withdraw their boomers to home waters. Other U.S. experts insisted that in view of U.S. detection capabilities, the Soviets had little choice. The Walkers' secrets were almost certainly more subtle—but even learning such details as when the Nimitz followed a certain Soviet sub on a certain day would tip the Soviets to what the Navy knew and when it knew it. And in the tricky undersea game of ASW, a little information can be damaging indeed.

MELINDA BECK with KIM WILLENSON and NICHOLAS M. HORROCK in Washington